OSPREY NEST SITE SURVEY AND MONITORING ON THE ALPINE AND SPRINGERVILLE RANGER DISTRICTS OF THE APACHE-SITGREAVES NATIONAL FORESTS

J. Robert Vahle, Region I, Wildlife Program Manager
Field Operations Division

and

Gregory L. Beatty, Bald Eagle Management Coordinator
Nongame Branch, Wildlife Management Division

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Program Chief: Terry B. Johnson
Arizona Game and Fish Department
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Phoenix, Arizona 85023-4312

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INTRODUCTION

The osprey (*Pandion haliaetus*) is classified on the Arizona Game and Fish Department's list of *Threatened Native Wildlife in Arizona* as "threatened," due to concerns about potential loss of its nesting habitat and foraging perch sites (AGFD 1988). Due to its specialized habitat requirements and its dependency on capture of fish to meet its dietary needs, the osprey now occurs in Arizona only near larger reservoirs, lakes, rivers, and streams. However, historical information refers to the osprey as a "rare" species in Arizona, occurring almost statewide near large water bodies, especially during migration and winter periods. Limited nesting activity historically occurred south of the Mogollon Rim, and ospreys were rarely found in the summer (i.e. nesting season) north of the Rim (Swarth 1914, Phillips et al. 1964). This information contrasts with the present known distribution of active osprey nest sites in Arizona.

In 1986, 16 active osprey nests were found in Arizona during a statewide assessment to determine the nesting status of the osprey in the Southwest (i.e. AZ, NM, TX, OK). The 16 nests, all of which were north of the Mogollon Rim, represented the entire population known for the Southwest (Vahle et al. 1988). They included 8 sites in Apache County, 4 in Navajo County, 2 in Coconino County, and 2 in Greenlee County. Eight were on the Fort Apache Indian Reservation (FAIR), six on the Apache-Sitgreaves National Forests (ASNF), one on the Coconino National Forest, and one on the Kaibab National Forest. The six ASNF sites were on the Alpine Ranger District. Five of the sites (Caldwell, Platform, Bear, Wildcat, and Reservation) were along the Main Fork of the Black River. One (Horse) was located along Horse Creek.

This study responded to the need to update and collect additional information on the osprey's nesting distribution and reproductive activity in Arizona. It was funded through a Heritage Grant that provided for helicopter flight time. The primary objectives were to: 1) re-survey and monitor the nest sites active in 1986 on the Alpine Ranger District of the ASNF, using helicopter surveys and a Global Positioning System (GPS); 2) survey additional areas on the Alpine and Springerville Ranger Districts to locate and map new nest sites, and determine their reproductive status; 3) determine the effectiveness of helicopter surveys in locating nest sites and documenting nesting activity and reproductive status; and 4) evaluate the effectiveness and accuracy of using GPS equipment from a helicopter to locate and map osprey nests.

Study Area

Our survey was conducted along selected river and stream drainages, and around reservoirs on the Alpine and Springerville Ranger Districts of the ASNF, in east central Arizona (Fig. 1). The drainages included: 1) the Main and West forks of the Little Colorado River; 2) the Main, East, and West forks of the Black River; and 3) Fish Creek. The reservoirs included: 1) the Greer lakes; 2) Lee Valley Lake; 3) Crescent Lake; and 4) Big Lake. Elevations of the areas surveyed ranged from ca. 7200 to 9400 feet. The river and stream drainages surveyed were predominantly in moderate to deep canyons that dissect upland plateaus and mountainous terrain north of the Mogollon Rim. The reservoirs were in both open high elevation grasslands, consisting of gentle terrain adjacent to moderate forested slopes (e.g. Big Lake), and in riparian/meadow valleys adjacent to steep forested slopes (e.g. the Greer lakes).

Vegetation within the study areas consisted of various community types and species. Riparian vegetation along the drainages surveyed included species associated with "riparian forest" and "riparian scrub" community types (Szaro 1989). Community types encountered included: 1) *Picea pungens* (blue spruce); 2) *Populus angustifolia* (narrowleaf cottonwood); 3) *Alnus tenuifolia* (thinleaf alder); 4) *Alnus tenuifolia* - mixed deciduous; 5) *Salix bebbiana* (Bebb's willow); 6) *Salix exigua* (coyote willow); and 7) *Salix irrorata* (bluestem willow).

Upland habitats adjacent to the riparian drainages and reservoirs surveyed consisted of species associated with the Rocky Mountain subalpine conifer forest (121.3), Rocky Mountain montane conifer forest, Great Basin conifer woodland (122.4), montane meadow grassland (143.1), and cold-temperate wetland community types (Brown 1982).

Major overstory trees included blue spruce, Engelmann spruce (*Picea engelmannii*), white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), quaking aspen (*Populus tremuloides*), and gambel oak (*Quercus gambelii*).

Dominant understory plants included shrubs such as common juniper (*Juniperus communis*), currants (*Ribes* sp.), Arizona rose (*Rosa arizonica*), and buckbrush ceanothus (*Ceanothus fendleri*); and understory herbaceous plants such as Arizona fescue (*Festuca arizonica*), mountain muhly (*Muhlenbergia montana*), bottlebrush squirreltail (*Sitanion hystrix*), sedges (*Carex* sp.), American vetch (*Vicia americana*), dandelion (*Taraxacum officinale*), groundsels (*Senecio* spp.), and fleabanes (*Erigeron* spp.)

METHODS

An aerial survey was conducted on June 24, 1993 using a Bell - Jet Long Ranger helicopter (see Fig. 1). A total of 3.4 flight hours was used to survey approximately 50 miles of habitat along the river/stream drainage systems, and within an approximate 0.5 mile perimeter area around each reservoir. Two observers were used to watch for presence of ospreys and their nest sites. Osprey nest sites in the study area characteristically consist of large stick nests in the tops of large dead trees (snags), particularly ponderosa pine, and are relatively easy to detect (Vahle et al. 1988).

Once a nest site was located the observers used binoculars from a distance in the helicopter to determine if there were adult birds in or around the nest and the activity of the bird (e.g. adult brooding young). The helicopter was then flown to a location directly over and approximately 200 feet above the nest, where a GPS "point" location reading was taken with a portable GPS unit (Trimble Navigation -"GPS Pathfinder Basic• Plus"). The observers again used binoculars to assess presence of adults, nestlings, and eggs in the nest to record the breeding status (Postapulsky 1974) of the site.

Nest site "point" information collected by the GPS unit was later differentially corrected for accuracy by the ASNF Base Station. This Base Station "differentially corrects" for a random 0-100 meter error installed by the Department of Defense (DOD). This error is installed by the DOD for national security purposes. It was then entered into an ARC-INFO Geographic Information System (GIS), which was used to plot nest site locations on maps.

Follow-up visits were conducted on August 5-6 and 16-17, 1993 to re-evaluate the final reproductive status of accessible nest sites which were located during the helicopter survey.

RESULTS

Twenty osprey nests were located during the helicopter flights (Fig. 2). Nests were found on the Little Colorado River (n=1), River Reservoir in Greer (n=1), West Fork Black River (n=2), Horse Creek (n=1), East Fork Black River (n=4), and the main stem of the Black River (n=11). All 20 nests were in ponderosa pine trees (snags and live trees). Four nests were built on artificial platforms constructed by the USFS (Vahle et al. 1988) in live ponderosa pines. Except nest site #10 (Caldwell site) located in a snag-top live ponderosa pine, all other nests found (n=15) were in the tops of snags (Table 1.).

Eleven of the 20 nests discovered were active, with either nestlings (4-5 weeks old) or eggs present (Table 1). The status of the remaining nests was either unoccupied (n=7) or undetermined (n=2). Fifteen young were produced from 7 successful nests out of the 11 active sites. Four nests where birds were still observed incubating during the June flight failed. An average of 1.36 fledglings were produced per active nest, and an average of 2.14 young were produced per successful nest (Table 3).

DISCUSSION

Objective 1 of the study was to monitor the six nest sites found in 1986 on the Alpine Ranger District (Tables 1-3). Five of the six nests found in 1986 were active. One nest was determined to be unoccupied. All of the sites were re-visited in August of 1993 (Table 2). Four of 5 active sites ("Horse," "Platform," "Wildcat," "Reservation") were successful and fledged 8 young, for an average of 1.6 young per active nest (Table 3). The "Caldwell" site was unoccupied, and the "Bear" site, which was seen with two eggs in June, failed.

Productivity of the six nests monitored in 1986 (Vahle et al. 1988) was comparable to reproduction at the same sites in 1993. In 1986, 1.5 young fledged per active nest; in 1993, 1.6 young fledged per active nest. Henny and Wight (1969) calculated that an annual productivity of 0.95-1.30 young per active osprey nest is needed to offset mortality and maintain population stability. Although no attempts were made between 1986 and 1993 to assess the entire breeding population in Arizona or monitor productivity, the six comparable sites are reproducing above what is required for population stability.

Objective 2 of the study was to locate additional nest sites and relocate known nests on the Alpine and Springerville Ranger Districts. Fourteen nest sites were located during the helicopter survey (Tables 1-2). Six nests were active; the remaining eight were unoccupied. Three nests (#2, #13, #17) had nestlings 4 to 5 weeks old. Three nests (#3, #12, #18) had birds still incubating eggs. Eight adults, 7 nestlings, and 7 eggs were observed at the active nests.

Nine of the 14 "new" sites were re-visited by AGFD in August 1993 (Table 2). Three active nests (#3, #18, #17) were not re-visited. Nest #12, where ospreys were still incubating in June, was re-checked and had failed. The other two nests (#3 and #18) where ospreys were still incubating in June were not re-visited. However, these nests most likely failed, based on the advanced development of nestlings in other breeding efforts and the unsuccessful outcome of nest #12. Two of the three nests (#2 and #13) observed in June with nestlings were successful. Nest #17 was not re-checked due to its remote location. Based on the advanced age of the nestlings observed in nest #17 and the successful outcome of nests #2 and #13, nest #17 was also most likely successful.

On our return ground-visits, we observed ospreys at two nests (#4 and #15) where no ospreys were observed on the helicopter flight. These observations caused us to be unsure about the status (occupied?, failed earlier in the year prior to surveys?) of these two nests. Four unoccupied nests from the June flight were re-visited and were still unoccupied. For the successful newly discovered and relocated nest, there was an average of 1.17 young produced per active site (7 young/6 active nests).

Objective 3 of the study was to determine the effectiveness of a helicopter survey for locating osprey nests and assessing nesting status. Compared to ground surveys, we found that helicopter

survey is a very effective way to search for and locate osprey nests, since their characteristic structure (i.e. large stick nest on top of snags) is often readily visible from the air. Helicopters are particularly valuable in surveying canyons and drainages that may have limited access, and for locating sites in dense conifer forests. Sites in dense conifer forests are often difficult to locate and observe from the ground, due to the lack of suitable vantage points, whereas the same sites can often be observed from the air.

To accurately assess activity and productivity of a nest site, it is important that the observer be able to look into the nest to determine presence of eggs, nestlings, fledglings, and adults. This is often difficult or impossible to do from the ground, particularly when the nestlings or fledglings, for example, are crouched in the bottom of the nest. The helicopter enabled us, in most cases, to inspect the nest and determine its contents from a distance. However, in a few cases the eggs and nestlings were camouflaged by the nest. This made identification of the nest's contents and accurate classification of nesting status difficult.

Raptor productivity surveys should occur at least twice throughout the breeding cycle, during incubation and when nestlings are 80 percent full-grown (Postapulsky 1974, Steenhof 1987). Our search occurred when nestlings were approximately 50 percent grown, to maximize the return (occupancy and number of nestlings) for our effort. Lack of funding for a flight during incubation caused us to be unsure about the status of a minimum of two nests (#4 and #15). Future surveys to determine productivity should use the guidelines established by Postapulsky (1974) and Steenhof (1987).

Objective 4 of the study was to determine the effectiveness and accuracy of mapping nest sites through use of GPS equipment from the helicopter. We encountered several difficulties in taking accurate GPS "point" readings from the helicopter. Consequently, the results in nest site location mapping by use of the GPS equipment were mixed. Initially, we tried to take GPS point readings while centered over the nest site at approximately 200 feet above the nest. GPS locations acquired at this level were accurate.

However, in several situations we could not get a GPS point reading unless the helicopter climbed higher above the nest and out of the canyon. In some cases it required us to climb 1500 feet in elevation to obtain a GPS reading. The higher the elevation that was required to obtain the GPS reading, the more difficult and inaccurate it became to remain centered over the nest. Thus, the end result was an inaccurate point location of the nest. Even so, these inaccurate locations were helpful in getting a general location for the nest. We were then able to use the general location to precisely map the nest from the ground.

MANAGEMENT RECOMMENDATIONS

1. Query agencies throughout Arizona for osprey nest locations and past nesting information to update AGFD's Heritage Data Management System and the Arizona Breeding Bird Atlas.

2. Have the U.S. Forest Service and AGFD coordinate annually to monitor statewide productivity of osprey nests, using volunteers, AGFD Wildlife Managers, Forest Service biologists, White Mountain Apache Game Rangers, and through biologists working on other projects in the same area as nesting ospreys.

3. At least once every five years survey by helicopter the most inaccessible osprey nesting habitat to determine distribution and population trends.

4. To increase number of nesting pairs, place osprey nesting platforms in locations where foraging habitat is available but nesting habitat appears to be limiting (i.e. Big Lake, Lee Valley Reservoir).

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